pride in his managerial recommendations that enabled others to do research than in his own scientific accomplishments. The report of the committee under his chairmanship, "Prospectus on Nucleonics" (1944), was the first comprehensive study of the probable impact of nuclear energy on industry and society and served to trigger scientists' wider concern in public affairs before the atomic bombing of Hiroshima.

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Many of Jeffries' professional papers have been deposited with the American Philosophical Society, Philadelphia.

II. Secondary Literature. A biographical article by C. G. Suits and a list of publications will appear in *Biographical Memoirs. National Academy of Sciences* (in press). A full biography of Jeffries written by William Mogerman is to be published by the American Society for Metals (Cleveland, in press).

Cyril Stanley Smith

JENKIN, HENRY CHARLES FLEEMING (*b.* near Dungeness, Kent, England, 25 March 1833; *d.* Edinburgh, Scotland, 12 June 1885), *engineering.*

Fleeming (pronounced "Fleming") Jenkin was the only child of Charles Jenkin, a naval officer, and the former Henrietta Camilla Jackson, a political liberal and popular novelist. He received his early schooling in Edinburgh. His family, in reduced financial circumstances, lived in Frankfurt, Paris, and Genoa during the period 1846–1851; he received the M.A. degree from the University of Genoa in the latter year.

After ten years of employment in various British engineering firms, mainly in the design and manufacture of the earliest long submarine cables (such as that under the Red Sea) and the associated cable-laying equipment, Jenkin in 1861 formed a consulting engineering partnership in London. In the same year his close friend William Thomson initiated the Committee on Electrical Standards of the British Association for the Advancement of Science, of which Jenkin was appointed reporter. Jenkin's lasting reputation in electrical science rests largely on his contributions to the work of this committee, through policy direction, participation in experiments, and the writing or editing of six reports between 1862 and 1869. Of major importance was the establishment of the ohm as an absolute unit of resistance, including the preparation of materials for construction of reliable resistance units, and the development of precision methods (0.1 percent) for resistance measurement. In 1867 he made the first absolute measurement of capacitance. Collaborators in the committee's activities included Thomson, James Clerk Maxwell, Carey Foster, Latimer Clark, and Charles Wheatstone.

Taking part in numerous cable-laying expeditions after 1861, Jenkin often shared the consultant duties with Thomson. Of his thirty-five British patents, many on cable-laying inventions were held jointly with Thomson. The patents and consulting work eventually made him financially independent.

Jenkin was a man of extremely broad interests. In a long essay written in 1867 he advanced detailed arguments—based on animal breeding experiments, genetic probabilities, and contemporary estimates of the geological time scale—for rejecting the two principal evolution mechanisms (indefinite variation and natural selection) proposed by Darwin in the first four editions of *The Origin of Species*. Jenkin asserted that a large body of available evidence dictated two conclusions opposing Darwin's views. First, the possible variations of an existing species must be considered as quite limited and "contained within a sphere of variation" centered on a norm. Second, the probability of favorable variations in a single individual becoming incorporated in a population must be slight, since such variations are infrequent and their effect is diluted by the breeding of the rest of the population. The remainder of his essay questioned Darwin's implicit assumption of the indefinite age of the earth. In the fifth (1869) edition, and in correspondence with others, Darwin acknowledged that he had modified some of his opinions substantially after reading Jenkin.

After 1876 Jenkin waged a vigorous campaign against unsanitary plumbing practices in Edinburgh and elsewhere, and he actively promoted the automated electric transport of industrial raw materials by monorail and cable car (telpherage.)

The Royal Society (London) elected Jenkin a fellow in 1865; the Royal Society of Edinburgh followed suit

in 1869, and he was its vice-president in 1879. He was also a member of the Institution of Civil Engineers and held an honorary LL.D. from the University of Glasgow (1883).

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Papers Literary, Scientific, etc. by the Late Fleeming Jenkin, F.R.S., Sidney Colvin and J. A. Ewing, eds., 2 vols. (London, 1887), contains, principally, the Stevenson memoir (see below) and Jenkin's nontechnical writings. Of interest are a short note by Kelvin on Jenkin's contributions to electricity, a longer note by A. Ferguson on Jenkin's contributions to sanitary reform, a concise list of Jenkin's patents, and brief abstracts of all of his scientific and engineering papers. *Electricity and Magnetism* (London, 1873) is an elementary textbook that went through many English and foreign-language eds. Jenkin edited *Reports of the Committee on Electrical Standards* (London, 1873), which contains the six reports of the committee, a summary report by Jenkin, and Jenkin's five lectures on submarine telegraphy to the Royal Society of Arts in 1866. His arguments for rejecting Darwin's two main evolution mechanisms are in "The Origin of Species," in *North British Review*, **46**, no. 92 (June 1867), 277–318.

Robert Louis Stevenson, *Memoir of Fleeming Jenkin*, was written, out of friendship for Jenkin and his wife, as a preface for the collected papers edited by Colvin and Ewing. Its first separate appearance was an American ed. (New York, 1887). Stevenson had studied under Jenkin at Edinburgh and became a lifelong friend. This book-length biography is an unusual account of an unusual man. Its principal technical information is in Jenkin's letters written during cable-laying expeditions. It is included in most eds. of Stevenson's collected works.

A modern view of Jenkin's influence on Darwin's thought is Peter Vorzimmer, "Charles Darwin and Blending Inheritance," in *Isis*, **54** (Sept. 1963), 371–390. See also Loren Eisley, *Darwin's Century: Evolution and the Men Who Discovered It* (New York, 1958), ch. 8, which contains a summary of Jenkin's opposition to Darwin's theory of evolution and states that Mendel's work eventually proved Darwin correct.

ROBERT A. CHIPMAN

JENKINSON, JOHN WILFRED (*b.* London, England, 31 December 1871; *d.* Gallipoli, Turkey, 4 June 1915), *comparative embryology, experimental embryology.*

A pioneering experimental embryologist in England in the first part of this century, Jenkinson, through his researches and teaching, stimulated interest in what was then a relatively new field of developmental biology. He was the second son of William Wilberforce Jenkinson, a surveyor, and the former Alice Leigh Bedale. As a schoolboy at Bradfield College he was an avid botanist, and his records of a number of the plants to be seen near Bradfield were cited in George Claridge Druce's *Flora of Berkshire* (1897), which mentions a catalog that Jenkinson had made of the plants found in that vicinity.

When Jenkinson matriculated at Exeter College, Oxford, in 1890, it was with a classical scholarship; and during the next several years his studies centered on the classics, in which he attained honors, receiving his degree in *Litterae humaniores*. But he had managed to hear some lectures in biology; and in 1894 he turned to zoological studies with characteristic enthusiasm, entering University College, London, and gaining the necessary scientific background under the guidance of W. F. R. Weldon.

In zoology Jenkinson was drawn to embryology, and his study of normal comparative developmental biology led to an interest in experimental embryology. He was soon engaged in original investigation as he faced the difficulties involved in understanding growth and the causes of differentiation. Several stays in the Utrecht laboratory of the embryologist A. A. W. Hubrecht during vacation periods afforded Jenkinson further direction and facilities for researches which were published in 1900 in his first paper, on the early embryology of the mouse.

He returned to Oxford to assist in the teaching of comparative anatomy and embryology. In 1905 he added the D.Sc. (Oxon.) to the M.A. and was married to Constance Stephenson. The next year he was named university lecturer in comparative and experimental embryology, and Exeter College elected him a research fellow in 1909. But the course of his researches was not to be completed. With the outbreak of World War I he volunteered for service; sent to the Dardanelles, he was killed within days at Gallipoli.

His classical studies had given Jenkinson a broad perspective in his approach to the problems of the biologist. He particularly examined the concepts of vitalism from the Aristotelian to those of Driesch, whose neovitalism he strongly contested. Repeatedly, in his writings and lectures, he returned to the issue of vitalism, while in his own researches he experimented to clarify some of the conditions, both internal and external, determining embryological development. Both as a scientist and as a philosopher Jenkinson examined the premises on which his experimentation was based, convinced that the processes of growth and change so remarkably evident during embryogeny bore investigation and that it was possible to isolate physical and chemical factors that interacted and influenced the mechanics of development.